

1    1. A method of ensuring that a first component of a distributed system that normally has  
2    access to certain messages from other components thereof is additionally aware of a state  
3    of one or more of the other components that is relevant to an action performed by the first  
4    component,

5    the method comprising the steps practiced in the first component of:

6         receiving augmented ones of the certain messages, each of the augmented certain  
7         messages having been augmented by an other component to additionally contain  
8         information indicating the relevant state of the other component;

9         for at least some of the other components, retaining the relevant state from an  
10      augmented message of the other component; and

11         performing the action as determined by the retained relevant state.

1    2. The method set forth in claim 1 wherein:

2         the messages are part of a transaction;

3         the action belongs to the first component's portion of a protocol for ensuring that  
4         the results of the transaction are consistent in the components;

5         in the step of receiving augmented ones of the certain messages, the information  
6         indicating the relevant state indicates whether the transaction will modify data in the  
7         other component; and

8         in the step of performing the action, the first component optimizes the protocol as  
9         determined by the retained state.

1    3. The method set forth in claim 2 wherein:  
2         the protocol is a two-phase commit protocol;  
3         the first component is the coordinator for the protocol; and  
4         in the step of performing the action, the first component sends a message that  
5         aborts the transaction to an other component when the other component's retained state  
6         indicates that the transaction does not modify the data in the other component.

1    4. The method set forth in claim 3 wherein:  
2         the distributed system is a distributed database system and the components are  
3         database systems therein.

1    5. A method of ensuring that a first component of a distributed system that normally  
2         accesses messages that belong to a transaction and that are received from other  
3         components thereof is additionally aware of a state of one or more of the other  
4         components that is relevant to the transaction,  
5         the method comprising the steps practiced in the other component of:  
6                 determining the relevant state; and  
7                 augmenting certain of the messages sent in the course of the transaction with state  
8         information indicating the relevant state of the other component,  
9         the first component determining an action to be taken with regard to the transaction from  
10        the state information.

1    6. The method set forth in claim 5 wherein:

2           the relevant state indicates whether the transaction will modify data in the other  
3       component.

1     **7. The method set forth in claim 6 wherein:**

2           the protocol is a two-phase commit protocol; and  
3           the other component receives an abort message of the protocol when the relevant  
4       state indicates that the transaction will not modify the data in the other component.

1     **8. The method set forth in claim 7 wherein:**

2           the distributed system is a distributed database system and the components are  
3       database systems therein.

1     **9. A method of executing a two-phase commit protocol for a transaction, the transaction**  
2       involving a coordinator and a cohort and  
3       the method comprising the steps performed in the coordinator of:

4           receiving a message required for the transaction from the cohort, the message  
5       being augmented with state information indicating whether the transaction modifies the  
6       cohort's data;

7           retaining the state information for the cohort; and

8           if the state information for the cohort indicates that the transaction does not  
9       modify the cohort, sending an abort message of the two-phase commit to the cohort.

1    10. A method of executing a two-phase commit protocol for a transaction, the transaction  
2    involving a coordinator and a cohort and  
3    the method comprising the steps performed in the cohort of:  
4       augmenting a message that the cohort sends to the coordinator as part of the  
5    transaction with state information indicating whether the transaction will modify the  
6    cohort; and  
7       responding to messages received from the coordinator as required by the commit  
8    protocol,  
9    the coordinator sending a message of the commit protocol to the cohort as determined by  
10   the state information.

1 2 3 4 5 6 7 8 9 10  
Add AGZ